



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,972	10/15/2003	James D. Beasom	INT-009ADIV	7103
23646	7590	04/11/2005	EXAMINER	
BARNES & THORNBURG 750-17TH STREET NW SUITE 900 WASHINGTON, DC 20006			MULPURI, SAVITRI	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 04/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/685,972	Applicant(s) <del>SA</del> BEASOM, JAMES D.	
	Examiner Savitri Mulpuri	Art Unit 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2005.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-47 and 57-65 is/are pending in the application.
- 4a) Of the above claim(s) 40-53 and 65 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-39, 57-64 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/15/2003</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This action is in response to the applicant's communication filed on 1/3/2005, electing claims 1-47, 57-65 and further election of claims 1-39, 57-64, which was made on 3/17/05

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 6-10, 12-17, 57-63 are rejected under 35 U.S.C. 102(b) as being anticipated by Besom et al (Us 5,652,153).

Beasom teaches a method of fabricating a semiconductor device comprising the steps of: (a) forming a non selective N-type buried layer "12" comprising a first majority dopant having a first coefficient of diffusion and, (b) forming a selective P-type buried layer "36" comprising a second majority dopant having a coefficient of diffusion, wherein the step of forming non selective N buried layer is formed before steps of forming the selective P buried layer. With respect to claim 4, Beasom et al teaches the steps of forming the selective P-type buried layer includes the step of controlling the amount of second majority dopant relative to the amount of the first majority dopant such that the selective P-type buried layer over compensates the non selective N type buried layer completely throughout s the non selective N type buried layer in a region where the selective P type buried layer is formed. With respect to claim 6, Beasom et al

Art Unit: 2812

teaches the steps of forming the non selective N type buried layer includes the step of selecting the first majority dopant from one of As or Sb (see claim 15) and the step of selective P-type buried layer includes the step of selecting boron for the second majority dopant and also second majority dopant concentration to form P-buried layer is greater than maximum dopant concentration of non selective N-type layer, where N-buried layer is lightly doped ( $N^-$ ) and P-type buried layer. (see fig and related description)

With respect to claim 8, Beasom also discloses (a) forming an N-type layer on said non-selective N-type buried layer, (b) forming P-well extending from said selective p-type buried layer through N-type layer. With respect to claims 12-18, Beasom teaches forming P buried layer by implantation with second majority dopant of boron and also teaches diffusing N-type and P-type buried layers into the N-type buried layer and P-type buried layer includes the steps of implanting and diffusing the second majority dopant and forming  $N^-$  layer after formation of P-buried layer. Beasom also discloses up diffusion of first majority dopants and second majority dopants into N-layer to form regions "34, 36", wherein first majority dopants are up diffused to lesser depth than the second majority dopants (see fig. 2 and related description).

With respect to claims 57-64, the same explanation as mentioned above is applied. Additionally, Beasom teaches the first layer is insulator, which is oxide "16" and forming non-selective N-buried layer "12 (in fig. 2). Beasom teaches introducing impurities into the first layer to form buried layer "68) (see fig.5)

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 5, 11, 19-25, 26-39, 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beasom et al in combination with Pendharkar et al or Park et al.

With respect to claims 21-25, 26-29, Beasom teaches doped N-type layer "26" by epitaxy. However, Beasom do not teach implantation to form non-selective N-Buried layer. Pendharkar et al (US 2002/0053685) teaches implanting antimony to form nonselective buried layer "11" and P-buried layer "35" within the N-buried layer "11". Park et al also teaches implanting to form nonselective buried layer "23" and P-buried layer "27 c" within the N-buried layer "23" (see fig. 3 a-, 3 d).

It would have been obvious to one of ordinary skill in the art to implant into the semiconductor layer to form nonselective N-buried layer because ion implantation results the buried layer with uniform and precise and controlled intended depth by choosing the dose.

With respect to claim 3 it would have been obvious to one of ordinary skill in the art to implant P buried layer first and then implanting N buried layer later because it is immaterial because the result are same either P buried layer first followed by N buried layer later or vice versa because the implantation is blanket implantation to form nonselective buried layer, which means no mask is needed. With respect to claim 5, 11

Art Unit: 2812

P buried layer not completely over compensating the N-type buried layer and also N type buried layer having higher concentration than the concentration in P buried layer would have been well within the choice of one of ordinary skill in the art with respect to order of emitter, base, collector sequence or collector, base, emitter sequence and depending required characteristics of the BJTs.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art teaches N and P type buried layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Savitri Mulpuri whose telephone number is 571-272-1677. The examiner can normally be reached on Mon-Fri from 8 a.m. to 4.30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt, can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/685,972

Page 6

Art Unit: 2812

A handwritten signature in black ink, appearing to read 'Savitri Mulpuri', with a stylized, flowing script.

Savitri Mulpuri  
Primary Examiner  
Art Unit 2812